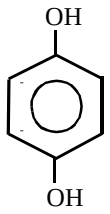
HYDROQUINONE

Hydroquinone is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 123-31-9

Molecular Formula: $C_6H_6O_2$



Hydroquinone occurs as colorless, hexagonal prisms. It is slightly soluble in benzene, partially soluble in water, and freely soluble in alcohol and ether. Hydroquinone solutions become brown in the air due to oxidation. The oxidation is very rapid in the presence of alkali (Merck, 1989).

Physical Properties of Hydroquinone

Synonyms: p-benzenediol; 1,4-benzenediol; benzoquinol dihydroxbenzene; quinol; hydroquinol; p-dihydroxybenzene; p-hydroquinone

Molecular Weight:	110.12
Boiling Point:	286.2 °C
Melting Point:	170.5 °C
Vapor Pressure:	1.9×10^{-5} mm Hg at 25 °C
Vapor Density:	3.81 20/4 °C (air = 1)
Flash Point:	329 °F
Conversion Factor:	1 ppm = 4.5 mg/m^3

(Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Hydroquinone is used as a reagent in the determination of small quantities of phosphate, as a photographic developer for black and white film, as an antioxidant for fats and oils, as a polymerization inhibitor, as a stabilizer in paints, varnishes, motor fuels, and oils, in human medicine for skin blemishes, as a chemical intermediate for dyes, or to produce rubber antioxidants (HSDB, 1991). The primary stationary sources that have reported emissions of hydroquinone in California are manufacturers of electronic components and accessories, newspaper printing and publishing facilities, and manufacturers of guided missiles and space vehicles (ARB, 1997b).

B. Emissions

The total emissions of hydroquinone from stationary sources in California are estimated to be at least 720 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of hydroquinone was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of hydroquinone.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of hydroquinone was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

No information about the atmospheric persistence of hydroquinone was found in the readily-available literature.

AB 2588 RISK ASSESSMENT INFORMATION

Although hydroquinone is reported as being emitted in California from stationary sources, no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to hydroquinone are inhalation, ingestion, and dermal contact (Sittig, 1991).

Non-Cancer: There is little information available on inhalation exposure in humans. Acute effects from ingestion of hydroquinone include tinnitus, headache, dizziness, gastrointestinal upset, central nervous system excitation, and skin depigmentation. Hydroquinone may cause methemoglobinemia. Direct contact is highly irritating to the eyes. Chronic occupational exposure may cause partial discoloration and opacification of the cornea (Sittig, 1991).

The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) for hydroquinone. The U.S. EPA has not established an oral Reference Dose (RfD) for hydroquinone, but has calculated a provisional RfD of 0.04 milligrams per kilogram per day. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of hydroquinone in humans. In studies in which rats were exposed to hydroquinone via gavage or orally there was a slight reduction in maternal body weight gain, decreased fetal weight, increased resorption rate, and reduced fertility in males (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of hydroquinone in humans. Mice treated dermally with hydroquinone showed an increased incidence of skin tumors. Increases in tubular cell adenomas of the kidney of male rats, and increases in mononuclear cell leukemia in female rats were observed in rats exposed via gavage. The U.S. EPA has not classified hydroquinone (p-hydroquinone) for carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified hydroquinone in Group 3: Not classifiable (IARC, 1987a).